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Bibliography

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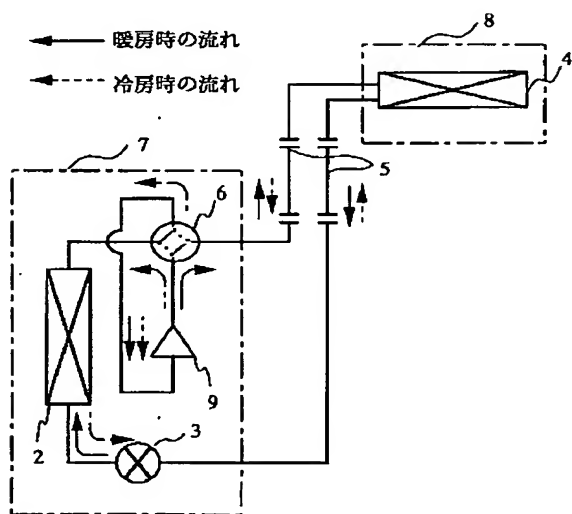
Epitome

(57) [Abstract]

[Technical problem] Offer the freezer which can reuse established piping used with CFC or the HCFC system refrigerant which contains a part for chlorine in the refrigerating cycle which used HFC or HC system refrigerant which does not contain a part for chlorine, and the established piping use approach in the freezer.

[Means for Solution] Established piping used with the equipment with which it filled up with the HCFC system refrigerant or CFC system refrigerant which is prepared into the refrigerating cycle which made sequential connection of a compressor, a condenser, a decompression device, and the evaporator, and this refrigerating cycle, and contains a part for chlorine, The HFC system refrigerant or HC system refrigerant with which a refrigerating cycle is filled up and which does not contain a part for chlorine, the HFC system refrigerant with which a compressor is filled up and which does not contain a part for chlorine, and mutual solubility are very small, and it has HC system refrigerant which has low viscosity with a fluidity so that it may return to a compressor when it flows into a refrigerating cycle, and does not contain a part for chlorine, and refrigerating machine oil with mutual solubility.

[Translation done.]



2: 熱源側熱交換器

3: 減圧装置

4: 利用側熱交換器

5: 既設配管

6: 四方弁

7: 空調機の室内機

8: 空調機の室外機

9: HFC410A-鉱油、アルキルベンゼン油の圧縮機

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CLAIMS

[Claim(s)]

[Claim 1] The freezer characterized by providing the following The refrigerating cycle which made sequential connection of a compressor, a condenser, a decompression device, and the evaporator Established piping used with the equipment with which it filled up with the hydrochlorofluorocarbon (HCFC) system refrigerant or chlorofluorocarbon (CFC) system refrigerant which is prepared into this refrigerating cycle and contains a part for chlorine The hydro fluorocarbon (HFC) system refrigerant or (Hydrocarbon HC) system refrigerant with which said refrigerating cycle is filled up and which does not contain a part for chlorine HC system refrigerant which said compressor is filled up with, the HFC system refrigerant and mutual solubility which do not contain a part for said chlorine are very small, and has low viscosity with a fluidity so that it may return to said compressor when it flows into said refrigerating cycle, and does not contain a part for said chlorine, and refrigerating machine oil with mutual solubility

[Claim 2] The freezer according to claim 1 characterized by using R410A or R407C, R407E, or R404A as said HFC refrigerant.

[Claim 3] The freezer according to claim 1 characterized by using a mineral oil system or an alkylbenzene oil system as said refrigerating machine oil.

[Claim 4] The freezer according to claim 1 characterized by using acid prehension material, wear prevention material, and antioxidizing material as add-in material of said refrigerating machine oil, choosing them suitably.

[Claim 5] The freezer according to claim 1 characterized by using an isobutane system or a propane system as said HC system refrigerant.

[Claim 6] The established piping use approach in the freezer characterized by connecting it to said refrigerating cycle after said HCFC system refrigerant washes established piping used with the equipment with which it filled up with the HCFC system refrigerant or CFC system refrigerant which is the established piping use approach in a freezer according to claim 1, and contains a part for said chlorine.

[Claim 7] The established piping use approach in the freezer characterized by connecting to said refrigerating cycle established piping used with the equipment with which it filled up with the HCFC system refrigerant or CFC system refrigerant which is the established piping use approach in a freezer according to claim 1, and contains a part for said chlorine as it is.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the technique reused to the hydro fluorocarbon (HFC) which does not include established piping used for the hydrochlorofluorocarbon (HCFC) containing a part for chlorine, or the refrigerant circuit where it filled up with the chlorofluorocarbon (CFC) system

refrigerant for a part for chlorine, or the freezer filled up with (Hydrocarbon HC) system refrigerant.

[0002]

[Description of the Prior Art] The freezer which used a HFC system refrigerant, a HFC system refrigerant, and ester oil with mutual solubility is indicated by JP,9-33114,A. Drawing 3 adds established piping to the basic circuit. In drawing, the heat-source side heat exchanger from which 1 becomes the compressor of HFC410A-ester oil at the time of air conditioning, and 2 becomes a condenser, the capillary tube whose 3 is a decompression device, the use side heat exchanger from which 4 becomes an evaporator at the time of air conditioning, and 6 are four way valves, piping connects with a serial and these constitute the refrigerating cycle by it. Moreover, 5 is established piping (embedding piping is included) used for HCFC containing a part for the chlorine which ties an exterior unit 7 and an interior unit 8, or the refrigerant circuit where it filled up with the CFC system refrigerant.

[0003] Moreover, for example, R410A is used for this freezer as a HFC refrigerant, and the ester oil which has mutual solubility for example, to R410A as refrigerating machine oil is used.

[0004] Next, actuation is explained using the pressure enthalpy chart shown in drawing 4. In the freezer constituted like drawing 3, in air conditioning, the refrigerant steam (A point in drawing) of elevated-temperature high pressure compressed with the compressor 1 is condensed by the heat-source side heat exchanger 2, serves as an about 0.1-dryness fraction vapor-liquid two phase refrigerant (B point in drawing), and flows into the use side heat exchanger 4 through the established piping 5 (C point in drawing).

[0005] Furthermore, this refrigerant evaporates in the use side heat exchanger 4, and returns to a compressor 1 through the established piping 5, and is compressed again. Moreover, the refrigerating machine oil breathed out with the refrigerant from the compressor 1 circulates through the inside of a refrigerant circuit with a steamy refrigerant and liquid cooling intermediation, and returns to a compressor 1.

[0006]

[Problem(s) to be Solved by the Invention] In the above-mentioned conventional freezer, although ester oil is used as refrigerating machine oil, ester oil is weak to contamination, it hydrolyzes in a refrigerating cycle, and it generates a sludge, and has a trouble of making a capillary tube etc. blockade.

[0007] Moreover, compared with the refrigerating machine oil of the mineral oil system used for a HCFC system refrigerant, and an alkylbenzene oil system, cost also has the demerit of being 2 to 3 times higher.

[0008] In addition, contamination is manufacture contamination, such as moisture, air, and a processing oil, and since a HCFC system refrigerant also contains a part for chlorine, it becomes a problem. If the HCFC system refrigerant (R22) has melted, and it oxidizes, and possibility with air etc. of carrying out corrosion degradation is high and reuses the established piping to the freezer which used a HFC system refrigerant and ester oil, the refrigerating machine oil which remains in established piping will have a possibility of generating a sludge, and will pose a problem in respect of quality. However, in the present condition, since it has not been a problem on quality, especially the approach of reusing established piping used with the HCFC system refrigerant to the freezer of a HCFC system refrigerant is performed.

[0009] On the other hand, although an ether oil is also raised, since it is easy to absorb moisture, there are demerits, like that contamination management is needed, that it is easy to carry out oxidation degradation, and cost also takes three to 4 times.

[0010] Moreover, although there is the approach of washing and using established piping which became dirty when using a HFC product, now, HCFC 225 and 141b etc. is used as a cleaning agent, and since this cleaning agent also contains a part for chlorine, since it becomes the cause of generating, such as a sludge, when it remains in established piping as a residue, there is a problem. Thus, from ester oil or ether oil, it was difficult for a problem to use many established piping, and it could not but use new piping.

[0011] This invention was not made in order to cancel this trouble, and it aims at offering the freezer which can reuse established piping used with CFC or the HCFC system refrigerant which contains a part for chlorine in the refrigerating cycle which used HFC or HC system refrigerant which does not contain a part for chlorine, and the established piping use approach in that freezer.

[0012]

[Means for Solving the Problem] The refrigerating cycle to which the freezer concerning this invention made sequential connection of a compressor, a condenser, a decompression device, and the evaporator, Established piping used with the equipment with which it filled up with the HCFC system refrigerant or CFC system refrigerant which is prepared into this refrigerating cycle and contains a part for chlorine, The HFC system refrigerant or HC system refrigerant with which a refrigerating cycle is filled up and which does not contain a part for chlorine, The HFC system refrigerant and mutual solubility with which a compressor is

filled up and which do not contain a part for chlorine are very small, and it has HC system refrigerant which has low viscosity with a fluidity so that it may return to a compressor when it flows into a refrigerating cycle, and does not contain a part for chlorine, and refrigerating machine oil with mutual solubility.

[0013] Moreover, R410A or R407C; R407E, or R404A is used as a HFC refrigerant.

[0014] Moreover, a mineral oil system or an alkylbenzene oil system is used as refrigerating machine oil.

[0015] Moreover, acid prehension material, wear prevention material, and antioxidizing material are used as add-in material of refrigerating machine oil, choosing them suitably.

[0016] Moreover, an isobutane system or a propane system is used as an HC system refrigerant.

[0017] The established piping use approach in the freezer concerning this invention After a HCFC system refrigerant washes established piping used with the equipment with which it filled up with the HCFC system refrigerant or CFC system refrigerant containing a part for chlorine, a HFC system refrigerant or HC system refrigerant, A HFC system refrigerant and mutual solubility are very small, and it connects with the refrigerating cycle with which HC system refrigerant which has low viscosity with a fluidity so that it may return to a compressor when it flows into a refrigerating cycle, and does not contain a part for chlorine, and refrigerating machine oil with mutual solubility were filled up.

[0018] Moreover, a HFC system refrigerant or HC system refrigerant, a HFC system refrigerant, and mutual solubility are very small as it is in established piping used with the equipment with which it filled up with the HCFC system refrigerant or the CFC system refrigerant containing a part for chlorine, and when it flows into a refrigerating cycle, it connects with the refrigerating cycle with which HC system refrigerant which has the low viscosity which has a fluidity so that it may return to a compressor, and does not contain a part for chlorine, and refrigerating machine oil with mutual solubility were filled up.

[0019]

[Embodiment of the Invention] The gestalt 1 of implementation of this invention is explained with reference to a drawing below gestalt 1. of operation. Drawing 1 is the refrigerant circuit Fig. of the freezer in the gestalt 1 of implementation of this invention. In drawing, 7 is the exterior unit of an air-conditioning machine, and consists of decompression devices 3, such as the compressor 9 of HFC410A-mineral oil and an alkylbenzene oil, the heat-source side heat exchanger 2, an electric-type expansion valve, and a capillary. 8 is the interior unit of an air-conditioning machine, and mainly consists of heat-source side heat exchangers 4. The exterior unit 7 of an air-conditioning machine and the interior unit 8 of an air-conditioning machine are connected for piping of two, and the established piping 5 used with the equipment with which it filled up with the HCFC system refrigerant or CFC system refrigerant which contains a part for chlorine in the middle is installed.

[0020] Moreover, R410A which is the mixed refrigerant of R32 and R125 as a refrigerant is used, and as refrigerating machine oil, for example, R410A and mutual solubility are very small to this freezer, and mineral oil with that specific gravity smaller moreover than the specific gravity of liquid cooling intermediation or an alkylbenzene oil is used for it.

[0021] Actuation of the refrigerant circuit of drawing 1 is the same as actuation of already explained drawing 4.

[0022] Since the refrigerating machine oil of the mineral oil system currently used with the HCFC system refrigerant or an alkylbenzene oil system is used according to the gestalt of this operation, it is hard to absorb moisture moisture and a sludge is not generated, either, established piping used with the equipment with which it filled up with the HCFC system refrigerant or CFC system refrigerant containing a part for chlorine can be diverted as it is.

[0023] Since the refrigerating machine oil of the mineral oil system currently similarly used with the HCFC system refrigerant or an alkylbenzene oil system is used Since most sludges will not be generated even if it washes established piping used with the equipment with which the HCFC system refrigerant or CFC system refrigerant containing a part for chlorine was filled up with the HCFC cleaning agent and a HCFC cleaning agent remains as a residue, Established piping used with the equipment with which it filled up with the HCFC system refrigerant or CFC system refrigerant containing a part for chlorine can be used as it is.

[0024] About the add-in material of refrigerating machine oil, you may not be and may add. When adding, they are wear prevention material (TCP), antioxidizing material, acid prehension material, etc.

[0025] The gestalt 2 of implementation of gestalt 2. of operation, next this invention is explained with reference to a drawing. Drawing 2 is the refrigerant circuit Fig. of the freezer in the gestalt 2 of implementation of this invention. In drawing, differing from drawing 1 of the gestalt 1 of operation is the point that the exterior unit 7 of an air-conditioning machine was equipped with the compressor 10 of HFC407C-mineral oil and an alkylbenzene oil.

[0026] With the gestalt of this operation, R407C which is the mixed refrigerant of R32, R125, and R134a as

a refrigerant is used. In addition, R407C may use R407E from which a mixed ratio differs with the mixed refrigerant of R32, R125, and R134a. Moreover, as refrigerating machine oil, R407C and mutual solubility are very small, and mineral oil with the specific gravity smaller moreover than the specific gravity of liquid cooling intermediation or an alkylbenzene oil is used, for example.

[0027] Actuation of the refrigerant circuit of drawing 2 is the same as actuation of already explained drawing 4.

[0028] Also in the gestalt of this operation, the same effectiveness as the gestalt 1 of above-mentioned operation is done so. With the gestalt of this operation, although R407C was used as a refrigerant, it can be similarly used for design pressure equivalent to R407C also about R404A which is the mixed refrigerant of R125, R134A, and R143A.

[0029] With the gestalten 1 and 2 of the gestalt 3. above-mentioned operation of operation, although the HFC system refrigerant was used as a refrigerant, HC system refrigerant can also be used. Since it does not react with contamination and a sludge etc. is not generated even if it uses established piping used with the equipment with which it filled up with the HCFC system refrigerant or CFC system refrigerant containing a part for chlorine as it is when a mineral oil system or an alkylbenzene oil system is used as refrigerating machine oil like a HFC system refrigerant since a part for chlorine is not included although it has a mineral oil system, an alkylbenzene oil system, and mutual solubility, HC system refrigerant is reusable.

[0030]

[Effect of the Invention] The freezer concerning this invention has the HFC system refrigerant or HC system refrigerant which does not contain a part for chlorine, the HFC system refrigerant which do not contain a part for chlorine, and very small mutual solubility, and since the HC system refrigerant which has the existing fluid low viscosity and does not contain a part for chlorine, and refrigerating machine oil with mutual solubility were used for it, it can use established piping used with the equipment with which it was filled up with the HCFC system refrigerant or the CFC system refrigerant containing a part for chlorine.

[0031] The established piping use approach in the freezer concerning this invention Since HC system refrigerant which a HFC system refrigerant or HC system refrigerant, a HFC system refrigerant, and mutual solubility are very small, has the existing fluid low viscosity, and does not contain a part for chlorine, and refrigerating machine oil with mutual solubility were used, After a HCFC system refrigerant washes established piping used with the equipment with which it filled up with the HCFC system refrigerant or CFC system refrigerant containing a part for chlorine, it can be connected and used for a refrigerating cycle.

[0032] Moreover, a HFC system refrigerant or HC system refrigerant, a HFC system refrigerant, and mutual solubility are very small, and since HC system refrigerant which has the existing fluid low viscosity and does not contain a part for chlorine, and refrigerating machine oil with mutual solubility were used, established piping used with the equipment with which it filled up with the HCFC system refrigerant or CFC system refrigerant containing a part for chlorine can be connected and used for a refrigerating cycle as it is.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the refrigerant circuit Fig. of the freezer in which the gestalt 1 of implementation of this invention is shown.

[Drawing 2] It is the refrigerant circuit Fig. of the freezer in which the gestalt 2 of implementation of this

invention is shown.

[Drawing 3] It is the refrigerant circuit of Fig. of the conventional freezer.

[Drawing 4] It is a pressure enthalpy chart showing actuation of the conventional freezer.

[Description of Notations]

1 The compressor of HFC410A-ester oil, 2 A heat-source side heat exchanger, 3 A decompression device, 4 A use side heat exchanger, 5 Established piping, 6 A four way valve, 7 The exterior unit of an air-conditioning machine, the interior unit of 8 air-conditioning machine, 9 The compressor of HFC410A-mineral oil and an alkylbenzene oil, 10 Compressor of HFC407C-mineral oil and an alkylbenzene oil.

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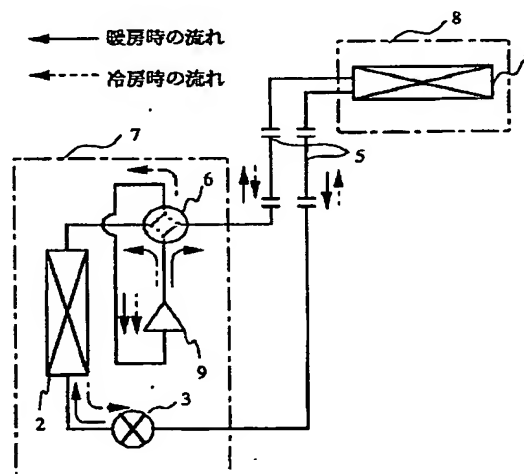
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(54) 【発明の名称】 冷凍装置及び冷凍装置における既設配管利用方法

(57) 【要約】

【課題】 塩素分を含まないHFCまたはHC系冷媒を使用した冷凍サイクルに、塩素分を含むCFCまたはHCFC系冷媒で使用した既設配管を再利用できる冷凍装置及びその冷凍装置における既設配管利用方法を提供すること。

【解決手段】 圧縮機、凝縮器、減圧装置、蒸発器を順次接続した冷凍サイクルと、この冷凍サイクル中に設けられ、塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管と、冷凍サイクルに充填され、塩素分を含まないHFC系冷媒またはHC系冷媒と、圧縮機に充填され、塩素分を含まないHFC系冷媒と相互溶解性が非常に小さく、かつ冷凍サイクルに流出した場合に圧縮機に戻るような流動性のある低い粘度を有し、また塩素分を含まないHC系冷媒と相互溶解性がある冷凍機油とを備えたものである。



- 2: 熱源側熱交換器
- 3: 減圧装置
- 4: 利用側熱交換器
- 5: 既設配管
- 6: 四方弁
- 7: 空調機の室内機
- 8: 空調機の室外機
- 9: HFC410A-鉱油、アルキルベンゼン油の圧縮機

【特許請求の範囲】

【請求項1】 圧縮機、凝縮器、減圧装置、蒸発器を順次接続した冷凍サイクルと、

この冷凍サイクル中に設けられ、塩素分を含むハイドロクロロフルオロカーボン(HCFC)系冷媒またはクロロフルオロカーボン(CFC)系冷媒が充填された装置で使用された既設配管と、

前記冷凍サイクルに充填され、塩素分を含まないハイドロフルオロカーボン(HFC)系冷媒またはハイドロカーボン(HC)系冷媒と、

前記圧縮機に充填され、前記塩素分を含まないHFC系冷媒と相互溶解性が非常に小さく、かつ前記冷凍サイクルに流出した場合に前記圧縮機に戻るような流動性のある低い粘度を有し、また前記塩素分を含まないHC系冷媒と相互溶解性がある冷凍機油と、を備えたことを特徴とする冷凍装置。

【請求項2】 前記HFC冷媒として、R410AまたはR407CまたはR407EまたはR404Aを使用することを特徴とする請求項1記載の冷凍装置。

【請求項3】 前記冷凍機油として、鉱油系またはアルキルベンゼン油系を使用することを特徴とする請求項1に記載の冷凍装置。

【請求項4】 前記冷凍機油の添加材として、酸捕捉材、摩耗防止材、酸化防止材を適宜選択して使用することを特徴とする請求項1記載の冷凍装置。

【請求項5】 前記HC系冷媒としてイソブタン系またはプロパン系を使用することを特徴とする請求項1記載の冷凍装置。

【請求項6】 請求項1記載の冷凍装置における既設配管利用方法であって、

前記塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管を、前記HCFC系冷媒で洗浄してから、前記冷凍サイクルに接続することを特徴とする冷凍装置における既設配管利用方法。

【請求項7】 請求項1記載の冷凍装置における既設配管利用方法であって、

前記塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管を、そのまま前記冷凍サイクルに接続することを特徴とする冷凍装置における既設配管利用方法。

【発明の詳細な説明】**【0001】**

【発明の属する技術分野】この発明は、塩素分を含むハイドロクロロフルオロカーボン(HCFC)、またはクロロフルオロカーボン(CFC)系冷媒が充填された冷媒回路に使用された既設配管を、塩素分を含まないハイドロフルオロカーボン(HFC)、またはハイドロカーボン(HC)系冷媒を充填した冷凍装置に再利用する技術に関するものである。

【0002】

【従来の技術】HFC系冷媒と、HFC系冷媒と相互溶解性があるエステル油とを使用した冷凍装置が、例えば特開平9-33114号公報に開示されている。図3はその基本回路に既設配管を付加したものである。図において、1はHFC410A-エステル油の圧縮機、2は冷房時に凝縮器となる熱源側熱交換器、3は減圧装置である毛細管、4は冷房時に蒸発器となる利用側熱交換器、6は四方弁であり、これらは配管によって直列に接続されて冷凍サイクルを構成している。または室外機7と室内機8を結ぶ塩素分を含むHCFC、またはCFC系冷媒が充填された冷媒回路に使用された既設配管(埋め込み配管を含む)である。

【0003】また、この冷凍装置にはHFC冷媒として例えばR410Aが用いられ、冷凍機油としては例えばR410Aに対して相互溶解性があるエステル油が用いられている。

【0004】次に動作について、図4に示した圧力-エンタルピー線図を用いて説明する。図3のように構成された冷凍装置において、冷房の場合、圧縮機1で圧縮された高温高压の冷媒蒸気(図中A点)は熱源側熱交換器2で凝縮し、乾き度0.1程度の気液二相冷媒となり(図中B点)、既設配管5を通して利用側熱交換器4に流入する(図中C点)。

【0005】さらに、この冷媒は利用側熱交換器4で蒸発し、また、既設配管5を通して圧縮機1に戻り、再び圧縮される。また、圧縮機1から冷媒とともに吐出された冷凍機油は、蒸気冷媒や液冷媒とともに冷媒回路内を循環し、圧縮機1に戻る。

【0006】

【発明が解決しようとする課題】上述の従来の冷凍装置では、冷凍機油としてエステル油を使用しているが、エステル油はコンタミに弱く、冷凍サイクル中で加水分解してスラッジを発生し、キャピラリチューブ等を閉塞させるという問題点がある。

【0007】また、HCFC系冷媒に使用する鉱油系、アルキルベンゼン油系の冷凍機油に比べ、コストも2〜3倍高いという短所がある。

【0008】なおコンタミとは、水分、空気、加工油等の製造コンタミであり、HCFC系冷媒も塩素分を含むため、問題になる。既設配管に残っている冷凍機油はHCFC系冷媒(R22)が溶け込んでいたり、また、空気等による酸化、腐食劣化している可能性が高く、その既設配管をHFC系冷媒とエステル油とを使用した冷凍装置に再利用すると、スラッジを発生する恐れがあり、品質の面で問題となる。ただし、HCFC系冷媒で使用した既設配管を、HCFC系冷媒の冷凍装置に再利用する方法は、現状では品質上特に問題になっていないため、行われている。

【0009】一方、エーテル油も上げられるが、吸湿しやすいためコンタミ管理が必要になること、酸化劣化し

やすいこと、コストが3～4倍もすること等の短所がある。

【0010】また、HFC製品を使用する時に汚れた既設配管を洗浄して使用方法があるが、現在のところ、洗浄剤としてHCFC225、141b等が用いられており、この洗浄剤も塩素分を含むため、スラッジ等の発生の原因になるため既設配管に残さとして残っていると問題がある。このように、エステル油やエーテル油では、問題が多く既設配管を利用することはむずかしく、新規の配管を使用せざるをえなかった。

【0011】この発明は、かかる問題点を解消するためになされたもので、塩素分を含まないHFCまたはHC系冷媒を使用した冷凍サイクルに、塩素分を含むCFCまたはHCFC系冷媒で使用した既設配管を再利用できる冷凍装置及びその冷凍装置における既設配管利用方法を提供することを目的とする。

【0012】

【課題を解決するための手段】この発明に係る冷凍装置は、圧縮機、凝縮器、減圧装置、蒸発器を順次接続した冷凍サイクルと、この冷凍サイクル中に設けられ、塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管と、冷凍サイクルに充填され、塩素分を含まないHFC系冷媒またはHC系冷媒と、圧縮機に充填され、塩素分を含まないHFC系冷媒と相互溶解性が非常に小さく、かつ冷凍サイクルに流出した場合に圧縮機に戻るよう流動性のある低い粘度を有し、また塩素分を含まないHC系冷媒と相互溶解性がある冷凍機油とを備えたものである。

【0013】また、HFC冷媒として、R410AまたはR407CまたはR407EまたはR404Aを使用するものである。

【0014】また、冷凍機油として、鉱油系またはアルキルベンゼン油系を使用するものである。

【0015】また、冷凍機油の添加材として、酸捕捉材、摩耗防止材、酸化防止材を適宜選択して使用するものである。

【0016】また、HC系冷媒としてイソブタン系またはプロパン系を使用するものである。

【0017】この発明に係る冷凍装置における既設配管利用方法は、塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管を、HCFC系冷媒で洗浄してから、HFC系冷媒またはHC系冷媒と、HFC系冷媒と相互溶解性が非常に小さく、かつ冷凍サイクルに流出した場合に圧縮機に戻るよう流動性のある低い粘度を有し、また塩素分を含まないHC系冷媒と相互溶解性がある冷凍機油とが充填された冷凍サイクルに接続するものである。

【0018】また、塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管を、そのままHFC系冷媒またはHC系冷媒と、HFC

系冷媒と相互溶解性が非常に小さく、かつ冷凍サイクルに流出した場合に圧縮機に戻るよう流動性のある低い粘度を有し、また塩素分を含まないHC系冷媒と相互溶解性がある冷凍機油とが充填された冷凍サイクルに接続するものである。

【0019】

【発明の実施の形態】実施の形態1. 以下、この発明の実施の形態1を図面を参照して説明する。図1はこの発明の実施の形態1における冷凍装置の冷媒回路図である。図において、7は空調機の室外機で、HFC410A-鉱油、アルキルベンゼン油の圧縮機9、熱源側熱交換器2、電気式膨張弁やキャピラリ等の減圧装置3で構成されている。8は空調機の室内機で、主に熱源側熱交換器4で構成されている。空調機の室外機7と空調機の室内機8は2本の配管で接続され、その途中に塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管5が設置されている。

【0020】また、この冷凍装置には、冷媒としてR32とR125の混合冷媒であるR410Aが用いられており、また冷凍機油としては例えばR410Aと相互溶解性が非常に小さく、しかもその比重が液冷媒の比重よりも小さな鉱油、またはアルキルベンゼン油が用いられている。

【0021】図1の冷媒回路の動作は、既に説明した図4の動作と同一である。

【0022】この実施の形態によれば、HCFC系冷媒で使用している鉱油系、またはアルキルベンゼン油系の冷凍機油を使用しているため、水分を吸湿しにくく、スラッジも生成されないため、塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管をそのまま流用できる。

【0023】同様にHCFC系冷媒で使用している鉱油系、またはアルキルベンゼン油系の冷凍機油を使用しているため、HCFC洗浄剤で塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管を洗浄して、たとえHCFC洗浄剤が残さとして残ってもスラッジはほとんど生成されないため、塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管をそのまま利用できる。

【0024】冷凍機油の添加材については、なくてもよいし、加えてもよい。加える場合は、例えば、摩耗防止材(TCP)、酸化防止材、酸捕捉材等である。

【0025】実施の形態2. 次にこの発明の実施の形態2を図面を参照して説明する。図2はこの発明の実施の形態2における冷凍装置の冷媒回路図である。図において、実施の形態1の図1と異なるのは、空調機の室外機7が、HFC407C-鉱油、アルキルベンゼン油の圧縮機10を備えた点である。

【0026】この実施の形態では、冷媒としてR32とR125とR134aとの混合冷媒であるR407Cが

用いられている。なお、R32とR125とR134aとの混合冷媒でR407Cとは混合比率の異なるR407Eを用いてもよい。また、冷凍機油としては、例えばR407Cと相互溶解性が非常に小さく、しかもその比重が液冷媒の比重よりも小さな鉱油、またはアルキルベンゼン油が用いられている。

【0027】図2の冷媒回路の動作は、既に説明した図4の動作と同一である。

【0028】この実施の形態においても、上述の実施の形態1と同様の効果を奏するものである。この実施の形態では、冷媒としてR407Cを用いたが、R125とR134AとR143Aとの混合冷媒であるR404AについてもR407Cと同等の設計圧力のため、同様に使用することができる。

【0029】実施の形態3. 上述の実施の形態1、2では、冷媒としてHFC系冷媒を用いたが、HC系冷媒を用いることもできる。HC系冷媒は、鉱油系、アルキルベンゼン油系と相互溶解性を有するが、HFC系冷媒と同様、塩素分を含んでいないため、冷凍機油として鉱油系、またはアルキルベンゼン油系を使用した場合、塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管をそのまま利用してもコンタミと反応せず、スラッジ等も生成されないため、再利用できる。

【0030】

【発明の効果】この発明に係る冷凍装置は、塩素分を含まないHFC系冷媒またはHC系冷媒と、塩素分を含まないHFC系冷媒と相互溶解性が非常に小さく、かつ流動性のある低い粘度を有し、また塩素分を含まないHC系冷媒と相互溶解性がある冷凍機油とを用いたため、塩素分を含むHCFC系冷媒またはCFC系冷媒が充填さ

れた装置で使用された既設配管を利用できる。

【0031】この発明に係る冷凍装置における既設配管利用方法は、HFC系冷媒またはHC系冷媒と、HFC系冷媒と相互溶解性が非常に小さく、かつ流動性のある低い粘度を有し、また塩素分を含まないHC系冷媒と相互溶解性がある冷凍機油とを用いたため、塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管を、HCFC系冷媒で洗浄してから、冷凍サイクルに接続して利用することができる。

【0032】また、HFC系冷媒またはHC系冷媒と、HFC系冷媒と相互溶解性が非常に小さく、かつ流動性のある低い粘度を有し、また塩素分を含まないHC系冷媒と相互溶解性がある冷凍機油とを用いたため、塩素分を含むHCFC系冷媒またはCFC系冷媒が充填された装置で使用された既設配管を、そのまま冷凍サイクルに接続して利用することができる。

【図面の簡単な説明】

【図1】 この発明の実施の形態1を示す冷凍装置の冷媒回路図である。

【図2】 この発明の実施の形態2を示す冷凍装置の冷媒回路図である。

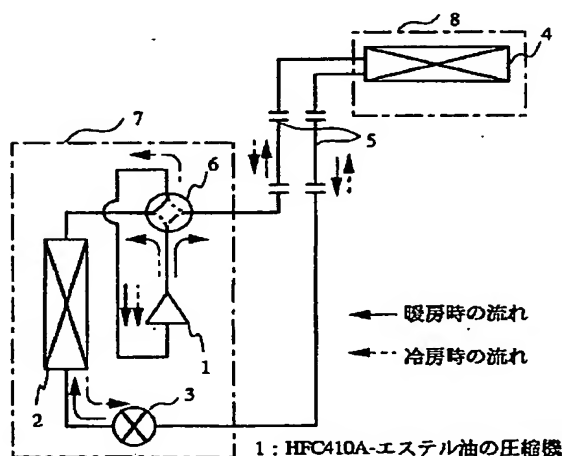
【図3】 従来の冷凍装置の冷媒回路図である。

【図4】 従来の冷凍装置の動作を表す圧力-エンタルピー線図である。

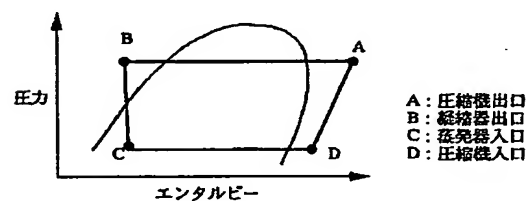
【符号の説明】

1 HFC410A-エステル油の圧縮機、2 熱源側熱交換器、3 減圧装置、4 利用側熱交換器、5 既設配管、6 四方弁、7 空調機の室外機、8空調機の室内機、9 HFC410A-鉱油、アルキルベンゼン油の圧縮機、10 HFC407C-鉱油、アルキルベンゼン油の圧縮機。

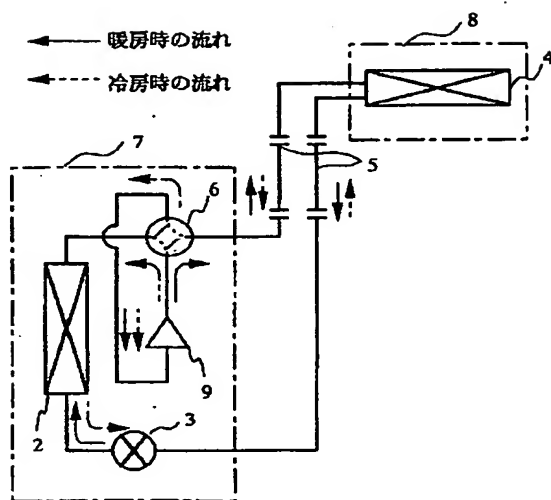
【図3】



【図4】

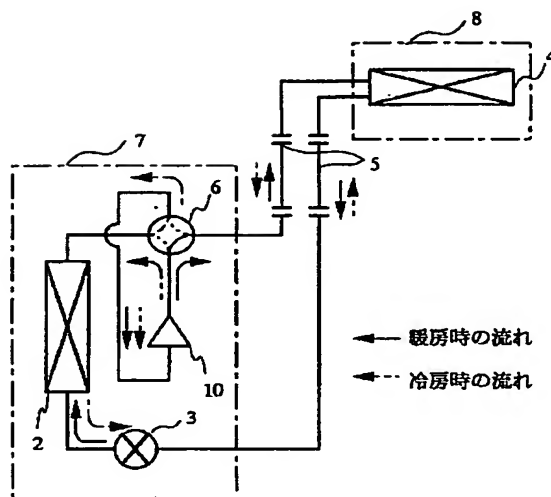


【図1】



- 2: 熱源側熱交換器
 3: 減圧装置
 4: 利用側熱交換器
 5: 既設配管
 6: 四方弁
 7: 空調機の室内機
 8: 空調機の室外機
 9: HFC410A-鉱油、アルキルベンゼン油の圧縮機

【図2】



- 10: HFC407C-鉱油、アルキルベンゼン油の圧縮機